positioning the tire carrier over the reactant metal, and then lowering the tire carrier vertically to immerse the tire carrier and tire portion in the molten reactant metal.

18. (New) The method of Claim 16 wherein the step of collecting liberated carbon includes defining a gas collection hood area between a surface of the molten reactant metal and a hood member after the tire portion has been placed in contact with the molten reactant metal and collecting the liberated carbon in the gas collection hood area together with gasses escaping from the molten reactant metal.

19. (New) The method of Claim 16 further including the step of circulating the molten reactant metal around the tire portion while the tire portion is immersed in the molten reactant metal.

REMARKS

The Applicant respectfully requests reconsideration and allowance of Claims 8 through 15, and consideration of new Claims 16 through 19 in view of the above amendments and the arguments set forth below.

THE CLAIMS 9 AND 13 ARE NOT OBJECTIONABLE UNDER 35 U.S.C. §112, ¶1

The Examiner rejected Claims 9 and 13 under 35 U.S.C. §112, first paragraph, in light of the reference to "approximately 800 degrees Celsius." In particular, the Examiner indicated that there was no support in the application for this temperature limitation. The Examiner also

objected to the amendment to the disclosure for the same reason. The Applicant respectfully traverses these claim rejections and the objection to the specification.

The present application incorporated the entire content of U.S. Patent No. 5,000,101 in accordance with the USPTO standards for incorporation by reference. See M.P.E.P. §608.01(p). The temperature limitation to which the Examiner objects is taken from this prior incorporated U.S. patent. In particular, the temperature of about or approximately 800 degrees Celsius appears in the incorporated patent at Col. 3, line 34 and line 57, and in Claim 11. Considering that this temperature limitation was included in the disclosure of the present application by the incorporation of U.S. Patent No. 5,000,101, the Applicant respectfully submits that Claims 9 and 13 are not objectionable under 35 U.S.C.§112, first paragraph, and that the amended disclosure is likewise not objectionable.

CLAIMS 8-19 ARE ALLOWABLE OVER THE CITED ART

The Examiner rejected Claims 8 through 15 under 35 U.S.C. §103(a) as being as being unpatentable over U.S. Patent No. 3,996,022 to Larsen (the "Larsen patent") in view of U.S. Patent No. 5,236,352 to Carpenter (the "Carpenter patent") and in view of U.S. Patent No. 2,858,255 to Segui et al. (the "Segui patent"). The Applicant respectfully submits that Claims 8 through 15 as amended are not obvious in view of the Larsen, Carpenter, and Segui patents and are entitled to allowance together with new claims 16 through 19. In particular, the Applicant submits that the Larsen, Carpenter, and Segui patents do not individually or as combined teach or suggest all of the elements set out in the present claims, and furthermore cannot be properly combined as proposed by the Examiner.

The Cited References Do Not Teach Or Suggest All Limitations Appearing In Independent Claims 8, 12, and 16

The present invention employs particular types of molten reactant metals to destroy tires and to recover useful products. A fundamental limitation appearing in each of the independent claims is that the reactant metal is not only capable of destroying organic compounds in the tires, but is also capable of dissolving the steel in the tire. Element (a) of Claim 8 requires contacting a tire portion with a molten reactant metal including aluminum under conditions facilitating the dissolution of steel into the molten reactant metal. Each of Claims 12 and 16 include similar limitations as to the nature of the reactant metal used in the present process. Claim 16 specifies the temperature of about 800 degrees Celsius for the reactant metal, as do dependent Claims 9 and 13.

The Larsen, Carpenter, and Segui references do not in any way teach or suggest contacting waste tires with any molten material that is at once capable of destroying the organic materials in the tires and dissolving the steel contained in the tires. Larsen discloses a process employing a molten salt catalyst to convert natural and synthetic rubbers into useful products. Carpenter teaches using hot oil and a slurry of liquified tire material itself at 400 degrees Celsius to liquify portions of the tire other than the steel belts and beads. The Segui Patent discloses using a molten metal bath of at 450 to 500 degrees Celsius to depolymerize certain types of polymers. Segui specifically teaches at Col. 1, lines 35 and 36 that the molten material is inert to the depolymerization. That is, the molten material is simply used as a heat transfer agent. Segui does suggest using aluminum in the molten bath, but specifically teaches against using a

chemically reactive bath, and thus suggests much lower bath temperatures than required in the present claims.

Claim 8 further requires that the step of contacting the tires with the molten reactant metal is done for a reaction period sufficient to allow substantially all organic materials originally included in the tire portion to react with the molten reactant metal but leaving the steel component substantially intact. Element (c) of Claim 8 requires removing the tire carrier immediately after the reaction period.

Claim 16 requires reacting a tire portion with a reactant metal at 800 degrees Celsius to produce liberated carbon. The claim further requires the steps of collecting the liberated carbon together with gasses escaping from the molten reactant metal, and retrieving the remaining steel component of the tire portion from the molten reactant metal. Although the Carpenter patent discloses a method in which rubber portions of a tire are liquified and the remaining steel is recovered, the process does not involve liberating carbon or collecting liberated carbon together with gasses escaping from the hot slurry. The make up and temperature of the slurry in the Carpenter reference simply prevents carbon from being liberated with gasses.

Because the cited references do not teach or suggest all of the limitations set out in Claims 8, 12, and 16, these claims are not obvious in view of the references and are entitled to allowance together with their respective dependent claims.

There Is No Teaching Or Suggestion To Make The Proposed Combination Of References

One of the basic requirements of a prima facie case for obviousness is that the prior art must provide some teaching, motivation, or suggestion to make the proposed combination. In

this case, the Applicant submits there is no such teaching, suggestion, or motivation, and thus that the combination of Larsen, Carpenter, and Segui proposed by the Examiner is improper.

Since the Larsen and Carpenter references do not teach or suggest using a molten metal to treat tires, the Examiner relied on the use of molten metals in the Segui reference in an attempt to meet the requirements of the present claims. However, the Segui patent is directed to a depolymerization process specific to a particular type of polymer and does not teach or suggest any process applicable to waste tires. **Furthermore, the Segui patent specifically teaches that the molten material is non-reactive, which is totally contrary to the requirement in the present claims of a reactant metal.**

The present invention relies on a particular characteristic of molten reactant metals including aluminum and similar metals at about 800 degrees C and above. These molten reactant metals react very quickly with organic compounds to liberate carbon along with various gasses such as hydrogen and nitrogen, and to produce metal salts. The claimed molten reactant metals also have the property of dissolving steels, including stainless steels, at a rapid pace. All of the prior art tire processing systems that use molten materials use materials that will facilitate the decomposition or reaction of organics in the tires, but do not react with the steel components of the tires. In fact, using a reactant metal that actually reacts with steel would seem to be undesirable since it would cause the steel to be lost to the molten bath rather than be left in a condition in which it could be easily recovered from the bath. However, the Applicant has determined that the particular reactant metals set out in the claims may be used to react the organic compounds in a tire without destroying the bulk of the steel in the tire if the remnant of the tire is removed from the bath promptly after a period of time required to destroy all the

organics. The Applicant has determined that this is possible due to location of the steel components in the tire vis-a-vis the organic material and due to the relative rates of reaction between the reactant metal and the organics as opposed to the reactant metal and the steel.

The cited prior art teaches using hot liquids such as oil, molten salts, certain low temperature, non-reactive molten metals to recover the organic components of waste tires. The prior art related to treating tires does not teach or suggest using a molten reactant metal. This is in spite of the fact that molten reactant metals of the type set out in the present claims have been used for some time in the treatment of other organic waste material as indicated by the incorporated patent, U.S. Patent No. 5,000,101. The invention in this case is the discovery that the type of molten reactant metals disclosed in U.S. Patent No. 5,000,101 may be used to treat waste tires and recover materials from tires in spite of the fact that the reactant metal at the specified conditions actually dissolves the steel components in the tires. The problem of using such a material to treat tires is that as steel dissolves into the molten reactant metal, it changes the characteristics of the molten material and ultimately begins to require higher and higher temperatures to maintain a molten state. Thus, it would appear to be undesirable to use the specified molten reactant metal to treat waste tires. Again, the invention in this case is ultimately the discovery that the specified molten reactant metal can be used to recover materials from waste tires despite the seemingly incompatible characteristic of dissolving steel.

The prior art does not suggest the use of the specified molten reactant metal to treat waste tires and does not show any appreciation for the problem of using such a material for treating waste tires. The tire treatment systems disclosed by Larsen and Carpenter use treatment materials that would allow the remaining steel components of the tires to be submerged in the

treatment material indefinitely with no adverse effect on the steel. The Segui patent, which is directed only to a depolymerization process for certain types of polymers, very specifically requires the molten metal to be inert to the depolymerization, that is, unreactive. There is simply no teaching, motivation, or suggestion in any of the prior art references or anywhere else in the prior art to combine the Larsen, Carpenter, and Segui references, or any other references of record in the case in any way to result in the invention set out in the present claims. Thus, the Applicant respectfully submits that all of the claims remaining in this case are not obvious in view of the prior art and are entitled to allowance.

The Shultz Patents and other References of Record

The Examiner rejected Claim 6 further in view of Shultz. The Examiner cited the Shultz patent for showing the use of a scrubber to purify organic off-gasses of a process. The Examiner did not indicate which Shultz reference was being cited, there are in fact two patents to Shultz of record in the case. However, neither Shultz patent (4,666,696 nor 4,552,667) makes up for the deficiencies of the primary references to Larsen, Carpenter, and Segui as to independent Claims 8, 12, and 16. The proposed combination of Larsen, Carpenter, Segui, and Shultz does not teach or suggest applying the specific molten reactant metal required in Claims 8, 12, and 16 to treat tires.

Other references of record in the case disclose treating tires in molten metal baths. For example, the Jagau reference, U.S. Patent No. 5,449,438 discloses treating tire parts in a bath of tin, lead, zinc, or alloys of these metals (the bottom of Column 4). However, the treatment temperature is below 550 degrees Celsius, a temperature specifically intended to minimize reaction with the tire components as set out at Col. 4, line 11 through 15. As with the other

references of record in this case, there is no teaching or suggestion in the Jagau reference to treat tires with a reactant metal capable of reacting with organic components in the tire and capable of dissolving the steel components in the tire.

CONCLUSION

For all of the above reasons and in view of the claim amendments, the Applicant respectfully requests reconsideration and allowance of Claims 8 through 15 and consideration and allowance of new claims 16 through 19.

If the Examiner should feel that any issue remains as to the allowability of these claims, or that a conference might expedite allowance of the claims, he is asked to telephone the undersigned attorney.

Respectfully submitted,

SHAFFER & CULBERTSON, L.L.P.

Date: 30 June 03

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CERTIFICATE OF FACSIMILE

I hereby certify that this correspondence is being facsimile transmitted to the United States Patent and Trademark Office, (Fax No. 703-872-9310) on June 30, 2003.

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